# MP3 Decoder (v1.15) on C64x+

## FEATURES

- **eXpressDSP Digital Media (XDM) Interface compliant**
- **ISO/IEC 11172-3 Layer 1, Layer 2, and Layer 3 compliant streams supported.**
- **Variable Bit Rate (VBR) and Constant Bit Rate (CBR) modes supported. The VBR encoding provides a higher overall sound quality with smaller file size**
- **Bit rates of 32 to 448 kbps for Layer 1, 32 to 384 kbps for Layer 2, and 8 to 320 kbps for Layer 3 supported.**
- **Mono, stereo, and dual channel input streams supported.**
- **Outputs 16-bit raw Pulse Code Modulation (PCM) samples. If two channels of audio data are produced, the output can be either in interleaved or block format.**
- **Layer 1 and Layer 2 decoder is compliant only with ISO/IEC 11172-3 (MPEG1 audio) standard.**
- **Layer 3 decoder is compliant with the following standards:**
  - **ISO/IEC 11172-3 (MPEG 1) (48 KHz, 44.1 KHz, and 32 KHz)**
  - **ISO/IEC 13818-3 (MPEG 2) (24 KHz, 22.05 KHz, and 16 KHz)**
  - **MPEG 2.5 extension (12 KHz, 11.025 KHz, and 8 KHz) sampling rates**
- **Does not support free format streams.**
- **Validated on DM648 EVM with code composer studio version 3.2.37.12 and code generation tools version 6.0.8.**
- **This codec is supported on any C64x+ based device**

## DESCRIPTION

MP3 is one of the most popular audio compression standards across wide spectrum of application ranging from portable player, cell phones, music systems, internet, and so forth.

PRODUCT PREVIEW

## Performance Summary

### Table 1. Configuration Table

| CONFIGURATION | ID |
|---|---|
| Layer1, Layer2, Layer3 Decoder | MP3_DEC_001 |

### Table 2. Cycles Information - Profiled on DM648 EVM with Code Generation Tools Version 6.0.8

| CONFIGURATION ID | PERFORMANCE STATISTICS (MEGA CYCLES PER SECOND)(1) | | |
|---|---|---|---|
| | TEST DESCRIPTION | AVERAGE | PEAK |
| MP3_DEC_001 | fl11.mp3 | 14.27 | 15.52 |
| | fl2.mp3 | 15.73 | 18.61 |
| | MJ44khz128kbps.mp3 | 17.00 | 21.58 |

(1) Measured with program memory, stack, and I/O buffers in external memory and with cache configuration 32K-bytes L1P cache, 16K-bytes L1D cache, and 64K-bytes L2 cache. L1 and L2 cache invalidation done for every frame

### Table 3. Memory Statistics - Generated with Code Generation Tools Version 6.0.8

| CONFIGURATION ID | MEMORY STATISTICS(1) | | | | TOTAL |
|---|---|---|---|---|---|
| | PROGRAM MEMORY | DATA MEMORY | | | |
| | | INTERNAL | EXTERNAL | STACK | |
| MP3_DEC_001 | 57.06 | 0.0 | 34.90 | 2.0 | 93.96 |

(1) All memory requirements are expressed in kilobytes (1K-byte = 1024 bytes).

### Table 4. External Data Memory Split-Up

| CONFIGURATION ID | DATA MEMORY - EXTERNAL(1) | | |
|---|---|---|---|
| | SHARED | | INSTANCE(2) |
| | CONSTANTS | SCRATCH | |
| MP3_DEC_001 | 15.79 | 6.75 | 12.36 |

(1) All memory requirements are expressed in kilobytes
(2) Does not include I/O Buffers

## Notes

- I/O buffers
  - Input buffer size = 2512 bytes
  - Output buffer size = 4608 bytes
- Total data memory for N non pre-emptive instances = Constants + Runtime Tables + Scratch + N* (Instance + I/O buffers + Stack)
- Total data memory for N pre-emptive instances = Constants + Runtime Tables + N* (Instance + I/O buffers + Stack + Scratch)

## References

- IISO/IEC IS 11172-3 Information Technology -- Coding of Moving Pictures and Associated Audio for Digital Storage Media at up to about 1.5 Mbps -- Part 3: Audio
- ISO/IEC IS 13818-3 Information Technology -- Generic Coding of Moving Pictures and Associated Audio Information -- Part 3: Audio
- MP3 Decoder on C64x+ User Guide (literature number SPRUF40)

## Glossary

| Term | Description |
|---|---|
| Constants | Elements that go into .const memory section |
| Scratch | Memory space that can be reused across different instances of the algorithm |
| Shared | Sum of Constants and Scratch |
| Instance | Persistent-memory that contains persistent information - allocated for each instance of the algorithm |

## Acronyms

| Acronym/Abbreviation | Description |
|---|---|
| CBR | Constant Bit Rate |
| EVM | Evaluation Module |
| Kbps | Kilo bits per second |
| KHz | Kilo Hertz |
| MP3 | MPEG1 Layer 3 |
| MPEG | Moving Pictures Experts Group |
| PCM | Pulse Code Modulation |
| VBR | Variable Bit Rate |
| XDAIS | eXpress DSP Algorithm Interface Standard |
| XDM | eXpressDSP Digital Media |

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